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AUTHOR Wonacott, Michael E.
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ABSTRACT

Career clusters are part of a response to changing work and a changing workplace, a way of broadening the focus of secondary career and technical education (CTE). The following are some of the changes in work and the workplace: the nature and structure of work; leadership styles and organizational structures; the knowledge and skills needed; values and commitment; and the importance of lifelong learning. Changes in CTE include a longer, broader-term conception of work, strengthened academics, strong secondary-postsecondary articulation, and entrance to long-term careers beyond entry-level jobs. Career clusters can help students build career pathways by providing a broader focus on preparation for the workplace. Teachers, instructional designers, career counselors, and administrators need to learn about career clusters and adapt and enlarge their roles to support the use of clusters with students. A working knowledge of career clusters includes their nomenclature, complexity, and ways they are organized. Although career cluster frameworks vary, they usually include lists of occupations as clustered in the framework, as well as local labor market trends and curriculum information for teachers. (This brief profiles the career cluster frameworks of Utah, Indiana, Oregon, Ohio, and the federal government.) (Contains 20 references.) (KC)

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No. 6

Michael E. Wonacott

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National Dissemination Center for Career and Technical Education
The Ohio State University
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Career Clusters

by Michael E. Wonacott

2001

If you are a secondary educator—career-technical education (CTE) teacher, academic teacher, career counselor, or administrator—you've probably encountered career clusters in one way or another. And you may have some basic questions:

- What are career clusters?
- What do career clusters mean to *you*?
- How are clusters organized?
- What information can a cluster framework provide?
- Can you use information from other cluster frameworks?
- And the bottom line?

What Are Career Clusters?

Career clusters are part of the answer to a difficult problem: Work and the workplace are changing and will continue to change. In response, change is occurring in secondary CTE; a broader focus is needed to prepare students for a lifetime of change in the workplace. Career clusters are one way to broaden the focus of secondary CTE, and secondary education in general.

Changes in Work and the Workplace

Technology and globalization are causing major changes in aspects of work (Dutton et al. 1997):

- **Nature and structure of work.** Worldwide computer networks have radically increased the speed and volume of information to process and share. They often replace humans in controlling processes and performing tasks. Free trade and international competition put a premium on variety, quality, and service.
- **Leadership styles and organizational structures.** Top-down organizations respond too slowly, so many midmanagement levels are disappearing, their duties and tasks transferred to front-line workers in high-performance companies.
- **Knowledge and skills needed.** Workers now need different knowledge and skills—understanding and using technology, adapting to change, solving problems, working in teams, communicating more effectively, information literacy, and a better understanding of the big picture and their part in it. Often called *employability skills,* examples include the Secretary's Commission on Achieving Necessary Skills (SCANS) set and O*NET's Worker Requirements (*The O*NET Content Model 2001*).
- **Values, expectations, and commitment required.** High performance, high technology, and a flatter hierarchy require personal responsibility and greater support for the values of the organization, such as total quality management.
- **Importance of education.** Education, particularly secondary CTE, must now prepare students for the workplace differently. Secondary CTE programs limited to specific occupational knowledge and skills are no longer sufficient. Lifelong learning skills will be needed for new and emerging careers and new skills demands in existing occupations—e.g., graphic artists using new multimedia tools will still be graphic artists but may need completely different skills. Furthermore, all students now need a preparation for the high-performance workplace that includes employability skills, a strong academic foundation, and a clearer picture of the world of work.

Changes in CTE

Secondary CTE must enhance its traditional focus on providing specific occupational preparation for entry-level jobs. In addition, CTE needs to prepare students to adapt to shifting employment opportunities and keep pace with changing technology and global economic trends. A new framework for CTE would have these features (Hoachlander 1998):

- **Broad, long-term conception of work.** Occupationally specific CTE should not be abandoned, but it should be provided in a larger context so that students can generalize learning, make connections between education and work, and adapt to changes in their jobs or careers.
- **Strengthened academic foundation.** Many students need the relevance of learning and applying essential academic skills in a work-related context. In general, this is best done in broadly defined areas—science as applied to the entire health industry, for example, rather than to a specific occupation like dental assistant.
- **Strong secondary-postsecondary connections.** A lifetime of change will mean a lifetime of learning, often including formal postsecondary education. Broader CTE programs (e.g., construction rather than carpentry) lend themselves better to a range of postsecondary options, including 4-year options.
- **Emphasis on long-term careers, beyond entry-level jobs.** For viable long-term careers, students will need academic knowledge and information literacy skills needed to keep pace with change.

Career Clusters for Broader Focus

Career clusters can help students build career pathways by providing the broader, long-term focus on preparation for the workplace (Edling and Loring 1996):

- Organizing programs around a whole range of occupations in a larger career area provides students with more alternatives and flexibility for both work and continuing education.
- Integrating academic knowledge and skills thematically in a career- or work-related context helps contextualize academic learning for students, making math, science, and communication relevant to students as a means to an important end—success at work and in life.
- Career clusters help integrate and contextualize employability skills and make them relevant to students.
- The workplace focus and potential for integrated, contextual learning make career clusters an appropriate educational framework for many students—perhaps all students.

- The concrete, specific context of career clusters helps students see both the big picture of a broad career area *and* how they can individually fit into the big picture.
- All in all, clusters are a happy medium—big enough to provide a relevant context for a wide range of knowledge and skills yet still small enough to be concrete and tangible.

What Do Career Clusters Mean to *You?*

If you work in a secondary system that doesn't use career clusters, they probably don't mean much to you right now. It would be appropriate to keep up with this new development in secondary CTE, particularly if career clusters are under consideration in your own school or district.

However, if you work in a secondary system that uses or is adopting career clusters, they'll have much more meaning for you, depending on what role you play (Andrew et al. 1997):

- **If you're a CTE teacher,** you may need to expand your focus on the workplace. Most likely, your focus is now on a set of closely related occupations; you'll need to inform yourself about all the occupations in a cluster or portion of a cluster.
- **If you're an academic teacher,** you may need to learn more about how workers apply and use academic skills in the workplace. The structure of career clusters provides a range of occupations as examples.
- **If you're designing or delivering integrated, contextualized academic and vocational instruction,** you'll probably need to work in a team. CTE and academic teachers each bring their own detailed knowledge to the team to design and deliver a thematic curriculum with academic knowledge and skills in concrete, relevant workplace applications.
- **If you're a career counselor,** you may need to expand your focus from guiding students toward a single occupation to a range of occupations. You'll probably need to learn where different occupations fit in clusters and what the occupations in a single cluster have in common.
- **If you're an administrator,** you'll need to provide the support and leadership to CTE teachers, academic teachers, and career counselors implementing career clusters. This includes time for CTE and academic teachers to meet and plan instruction as well as support for change and innovation, technology, and appropriate system structure.
- **No matter what role you play,** you'll need to become familiar with your own career cluster framework, identify the kinds of information you need to play role effectively, and locate information sources.

How Are Clusters Organized?

Table 1 presents seven different cluster frameworks. As you can see, nomenclature is not uniform. Some frameworks are more complex in levels or numbers of categories. Finally, frameworks differ in how clusters are organized.

Nomenclature

The first thing you might notice in Table 1 is that nomenclature varies widely. The highest category can be a *career field, endorsement area, career cluster,* or *industry sector,* depending on the framework. Of the seven cluster frameworks presented, three show second-level categories with different names—*career pathways* in Utah, *areas of emphasis* in Oregon, *career fields* in Ohio.

Complexity

Development work on U.S. Department of Education/Office of Vocational and Adult Education (USED/OVAE) career clusters and National Skill Standards Board (NSSB) industry sectors has frequently included identification of a second level of categories. Table 2 shows second levels for USED/OVAE career clusters and NSSB industry sectors for which information is available at the time of this writing. Nomenclature varies in USED/OVAE clusters, although continuing work on remaining clusters will use uniform nomenclature and is being coordinated with the five original projects to develop and retrofit a common framework (Green 2001). NSSB, on the other hand, uses a uniform term, *concentration,* for families of related jobs and occupations within an industry sector; NSSB's Common Framework calls for the identification of up to six concentrations in each industry sector (NSSB 2000). However, not all cluster frameworks have two levels of categories. Indiana's 14 career clusters (see Table 1) organize over 450 occupations with a single level of clusters.

Differences in Organization

Why are there such differences in the way different frameworks organize clusters? Each cluster framework reflects the workplace and the economy for which it is intended (Sommers 2001), and state economies can vary tremendously in what industries and what occupations are important. So, Oregon's Natural Resources endorsement area includes areas of emphasis in Aquatic and Marine Management, Forestry and Forest Products, and Fish and Wildlife Resource Management—which would not be appropriate for Ohio, where those activities are minor parts of the economy or nonexistent. Conversely, Ohio's large Industrial and Engineering Systems career cluster reflects the state's manufacturing economy and would not be appropriate for Oregon or Utah.

Another difference is that clusters can be organized by the industry to which occupations belong or by characteristics of the occupations themselves (Hoachlander 1998). An *industry* is defined by the product or service produced (e.g., automobiles, steel, or health services); an *occupation* (e.g., accountant, dental assistant, plumber) is defined by work performed. The two approaches are not mutually exclusive. Rather, choosing one or the other is a matter of emphasis and purpose. For example, the NSSB industry sectors listed in Tables 1 and 2 are explicitly organized by the industry to which occupations belong and are defined as "segments of the economy that share similar skill requirements" (NSSB 2000, p. 7).

Clusters can also be organized by common occupational characteristics (Dutton et al. 1997). The *cross-functional skills* approach organizes occupations by underlying general skills they share (e.g., SCANS skills). The *worker attribute* approach clusters occupations that relate closely to particular worker attributes—for example, O*NET's Worker Characteristics, which include abilities, interests and work values, and work styles (**The O*NET Content Model** 2001). The *work performed* approach groups occupations based on similar job duties, functions, tasks, and activities and common occupational knowledge, skills, and standards.

What Information Can a Cluster Framework Provide?

The information provided with cluster frameworks varies. You can usually expect to find at least lists of occupations as they are clustered in the framework. Often, cluster frameworks include other information about occupations, often through links with labor market information and career information systems:

- Descriptions or profiles of occupations, cross-functional skills, worker attributes, work performed
- Secondary and postsecondary preparation needed and availability
- Local labor market information
- Curriculum information for teachers to design instruction

Some specific examples from the cluster frameworks already considered are discussed.

Utah: Occupations and Expectations

Sample occupations are identified for each of the five career fields, organized under the career pathways in the field (***Career Field Brochures*** 2000). For example, these occupations are listed as examples in the Artistic Career Field brochure:

- **Communications Pathway**—journalist, broadcaster, public relations director, technical producer, interpreter
- **Performing Arts Pathway**—actor, actress, dancer, musician, singer
- **Visual Arts Pathway**—photographer, commercial artist, architectural designer, painter, interior designer, graphic artist

In addition, information is provided on what is expected of workers in all pathways in each field. The examples provided for Artistic Career Field Pathways combine cross-functional skills, worker attributes, and work performed—for example, *cope with changing conditions, be a creative problem solver,* and *adjust your work to meet the requirements of others.*

Indiana: 450 Occupations, Clustered and Profiled

Indiana's 14 career clusters cover over 450 occupations, each of which is profiled online (***Career Areas to Explore and Jobs in Them*** 2001) and in print in the following categories: introduction describing the occupation in general terms; worker characteristics, physical demands, and work setting; statewide labor market information; secondary preparation, postsecondary education and training, and licensing; and related occupations

In addition, career clusters and career profiles are integrated with the former Indiana Career Information System, which offers print and online Career Interest Checklists based on the Holland RIASEC (Realistic, Investigative, Artistic, Social, Enterprising, Conventional) categories. Additional career information is made available through online links to the ***Occupational Outlook Handbook*** (OOH 2001), searchable by occupation and browsable by OOH occupational clusters.

Oregon: Contextual Frameworks and Integration Tools

For each of its six endorsement areas, Oregon offers a contextual framework and a project integration tool for aligning instruction (***Certificate of Advanced Mastery*** 2001). Each contextual framework provides information about the entire endorsement area:

- The occupations included in each area of emphasis in the endorsement area (and, in some endorsement areas, clustered by the level of training, experience, or education required)
- Statement on how to use the contextual framework and description of its development
- A list of unifying concepts—essential, broad-based concepts important to the entire endorsement area around which teachers can integrate academic and technical knowledge and skills
- Lists of specific knowledge and skills that further define each unifying concept
- Suggested applications to show how each unifying concept can be applied in the context of the endorsement area

Each project integration tool guides teachers in designing projects in which students learn through applying knowledge, skills, and work behaviors to real-world environments, problems, and situations; projects in the endorsement area are designed to be aligned with state academic content and career-related learning standards. Each project integration tool includes—

- A brief, step-by-step procedure for teachers to follow in designing projects
- A project integration example for the endorsement area (includes description of the project, list of knowledge and skills students need to complete the project, and checklist for relevant areas of standards) and worksheet with the same components
- A multipart project alignment checklist to correlate the project with the endorsement area's unifying concepts and associated knowledge and skills, assessment and evidence techniques, civic/community connections, state Certificate of Initial Mastery/Certificate of Advanced Mastery (CIM/CAM) academic standards, and state career-related learning standards and criteria

Ohio: ITACs and OCAPs for Core, Clusters, and Specializations

Part of Ohio's Career-Focused Education (CFE), ***Ohio Career Resource*** (2001) provides labor market information using Ohio's 6 career clusters and 51 career fields to inform career-technical program planning. Labor market trends and profiles are available for each career field. Additional information is provided on about 700 occupations using Occupational Employment Statistics (OES) codes, titles, and definitions, with links to wages, skill sets, and a Career Tabloid (i.e., occupational profile), as well as a crosswalk to the Standard Occupational Classification (SOC) coding structure.

Integrated Technical and Academic Competencies (ITACs) in each cluster provide program and instructional planning resources for both academic and occupational teachers. Building on and expanding the Occupational Competency Analysis Profiles (OCAPs), which identified separate lists of occupational, employability, and academic competencies primarily for 11th- and 12th-grade programs, ITACs are designed to be used by all teachers, academic and occupational, in flexible CFE. Three types of ITACs integrate occupational, employability, and academic knowledge, skills, and attitudes and include expectations, scenarios, and academic connections (***Core ITAC for Career-Focused Education*** 1999):

- **Core ITAC:** 51 competencies in 6 strands essential for all careers, further education, and life, with sample work-related scenarios
- **Career Cluster ITACs:** foundational competencies common to each of the six career clusters, with work-related scenarios; a broad foundation for entry-level, technical, and professional careers
- **Specialization ITACs:** Competencies and sample scenarios critical for success in a single industry or occupation; current OCAPs represent specialization competencies and will be revised as Specialization ITACs.

USED/OVAE: Under Development

The 16 USED/OVAE career clusters are in various stages of development. Some information and materials are available for all five of the clusters first funded for development:

continued on p. 7

Table 1. Selected Career Cluster Frameworks

Utah's 5 Career Fields & 18 Career Pathways

Artistic
- Communications
- Performing Arts
- Visual Arts

Business
- Accounting & Finance
- Business Administration
- Marketing & Sales
- Office Technologies

Scientific
- Engineering Technologies
- Health Sciences & Technologies
- Life Sciences
- Physical Sciences

Social Humanitarian
- Education
- Government & Legal Services
- Social Services

Technical
- Construction & Maintenance
- Equipment Operation & Repair
- Information Technology
- Personal Services

Source: *Career Field Brochures* (2000)

Oregon's 6 Endorsement Areas & 34 Areas of Emphasis

Arts & Communication
- Fine & Applied Arts
- Performing Arts
- Humanities
- Communication

Business & Management
- Finance
- Hospitality, Tourism, Recreation
- Information Systems
- Marketing
- Management

Health Services
- Health Evaluation, including Diagnosis
- Health Operations
- Health Information
- Health Intervention, including various forms of Physical Therapy
- Health Promotion

Human Resources
- Criminal Justice & Corrections
- Fire Services
- Education & Related Programs
- Social & Government Services
- Family & Social Services

Industrial & Engineering
- Construction
- Electronics
- Integrated Technologies
- Manufacturing
- Mechanical
- Information Technology

Natural Resources
- Agriculture
- Aquatic & Marine Management
- Energy Management
- Environmental Management
- Fish & Wildlife Resource Management
- Forestry & Forest Products
- Geology & Mineral Industries
- Horticulture
- Recreation & Cultural Resource Management

Source: *Certificate of Advanced Mastery* (2001)

Ohio's 6 Career Clusters & 51 Career Fields

Arts & Communication
- Arts & Entertainment
- Arts Teaching
- Advertising
- Media & Journalism
- Printing & Publishing

Business & Management
- Finance, Insurance & Real Estate
- Personnel & Labor Relations
- Marketing
- Information Technology
- Hospitality & Tourism
- Food Service
- Administrative Support
- Cleaning Services
- Clothing & Fabric Services
- Distribution & Logistics
- General Business Management

Environmental & Agricultural Systems
- Animal & Crop Production
- Horticulture
- Agricultural Services & Engineering
- Food Processing
- Natural Resources & Environmental Services
- Education & Research

Health Services
- Doctors & Pharmacists
- Nursing & Dietetics
- Health Care Management
- Health Care Technology
- Health Sciences & Teaching
- Health Care Therapy
- Health Care Assisting
- Funeral Services

Human Resources/Services
- Education & Training Services
- Social Services & Public Administration
- Legal & Protective Services
- Personal Care Services

Industrial & Engineering Systems
- Auto & Truck Transport
- Water Transport
- Air Transport
- Railroads
- Transportation Systems Design & Management
- Materials Moving, All Modes of Transport
- Manufacturing Management
- Manufacturing Engineering & Technology
- Manufacturing Supervision & Inspection
- Precision Production
- Production Maintenance, Setup & Operation
- Production Setup & Operation
- Engineering
- Architecture & Drafting
- Construction
- Repair Services
- Mining

Source: *Ohio Career Resource* (2001)

Table 1. Selected Career Cluster Frameworks

USED/OVAE'S 16 Career Clusters & Descriptions

Agriculture & Natural Resources: planning, managing, and performing agricultural production and horticulture and landscaping services and related professional and technical services, mining and extraction operations, and managing and conserving natural resources and related environmental services.

Arts/Audio/Video Technology & Communications: designing, producing, exhibiting, performing, writing, and publishing multimedia content, including visual and performing arts and design, journalism, and entertainment services.

Architecture & Construction: designing, planning, managing, building, and maintaining physical structures and the larger building environment including roadways and bridges and industrial, commercial, and residential facilities and buildings.

Business & Administration: planning, managing, and providing administrative support, information processing, accounting and human resource management services and related management support services.

Education & Training: planning, managing, and providing education and training services and related learning support services, including assessment and library and information services.

Finance: planning, managing, and providing banking, investment, financial planning, and insurance services.

Government & Public Administration: planning, managing, and providing government, legislative, administrative, and regulatory services and related general purpose government services at the federal, state and local levels.

Health Science: planning, managing, and providing diagnostic, therapeutic, and information and environmental services in health care.

Hospitality & Tourism: planning, managing, and providing lodging, food, recreation, convention and tourism, and related planning and support services such as travel-related services.

Human Services: planning, managing, and providing human services including social and related community services.

Information Technology Services: designing, developing, managing, and supporting hardware, software, multimedia, and systems integration services.

Law & Public Safety: planning, managing, and providing judicial, legal, and protective services, including professional and technical support services in the fire protection and criminal justice systems.

Manufacturing: planning, managing, and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance, and manufacturing/process engineering.

Retail/Wholesale Sales & Services: planning, managing, and performing wholesaling and retailing services and related marketing and distribution support services including merchandise/product management and promotion.

Scientific Research & Engineering: planning, managing, and providing scientific research and professional and technical services (e.g., physical science, social science, engineering), including laboratory and testing services and research and development services.

Transportation Distribution & Logistics: planning, management, and movement of people, materials, and goods by road, pipeline, air, rail, and water and related professional and technical support services such as transportation infrastructure planning and management, logistics services, mobile equipment and facility maintenance.

Source: *U.S. DOE and OVAE 16 Career Clusters: Securing Futures* (2001)

NSSB 15 Industry Sectors

- Agriculture, Forestry & Fishing
- Business & Administrative Services
- Construction
- Education & Training
- Finance & Insurance
- Health & Human Services
- Manufacturing, Installation & Repair
- Mining
- Public Administration, Legal & Protective Services
- Restaurants, Lodging, Hospitality & Tourism & Amusement & Recreation
- Retail Trade, Wholesale Trade, Real Estate & Personal Services
- Scientific & Technical Services
- Telecommunications, Computers, Arts & Entertainment & Information
- Transportation
- Utilities, Environmental & Waste Management

Source: NSSB (2000)

Indiana's 14 Career Clusters

- Agriculture and Natural Resources
- Art, Media and Communications
- Building and Construction
- Business, Management and Finance
- Educational Services
- Engineering, Science and Technologies
- Health Services
- Legal, Social and Recreational Services
- Manufacturing and Processing
- Marketing, Sales and Promotion
- Mechanical Repair and Precision Crafts
- Personal and Commercial Services
- Protective Services
- Transportation

Source: *Career Areas to Explore and Jobs in Them* (2001)

Table 2. Second-Level Categories for Selected USED/OVAE Career Clusters and NSSB Industry Sectors

Selected USED/OVAE Career Clusters

Arts, Audio-Video Technology, and Communications: 6 Pathways
- Telecommunications Technology—installing, testing, and maintaining equipment and facilities; customer service
- Audio/Video Technology—production design process, audio production, video production, editing, and technical production support
- Journalism/Broadcasting/Film—writing for print and other media, broadcasting or oral presentation of information for multimedia, technical support for media production and products
- Printing Technology—general printing knowledge and skills; digital image preparation and output, layout and design
- Visual Arts—art and applied arts, graphic design, photographic art
- Performing Arts—dance and choreography, music and composition, theatre and playwriting, technical design and production (sound, stage sets, lighting, costumes, hair, and make-up)

Source: *AAVTC Cluster Standards* 2001.

Health Science: 4 Clusters
- Therapeutic—data collection, treatment planning, implementing procedures, client status evaluation
- Diagnostic—planning, preparation, procedure, evaluation, reporting
- Information Services—analysis, abstracting and coding, systems procedures, documentation, operations
- Environmental Services—environmental operations, aseptic procedures, resource management, aesthetics

Source: Hudis 2000.

Information Technology Services: 4 Concentrations/Pathways
- Network Systems—network design and administration
- Information Support and Services—database development and administration, technical writing, technical support, enterprise systems analysis and integration
- Interactive Media—digital media, web development and administration
- Programming and Software Development—programming/software engineering

Source: Education Development Center 2001.

Transportation, Distribution, and Logistics: 7 Pathways
- Transportation Operations—People and/or Freight
- Logistics Planning and Management—People and/or Freight
- Warehousing and Distribution Center Operations
- Facility and Mobile Equipment Maintenance
- Transportation Systems/Infrastructure Planning, Management, and Regulation
- Risk Management, Health/Safety, and Environmental Management
- Sales and Service—People and/or Freight

Source: *Career Pathway Framework, Version 3* 2001.

Selected NSSB Industry Sectors

Manufacturing, Installation, and Repair: 6 Concentrations
- Production—Set up, operate, control, and improve manufacturing processes and schedules to meet customer and business requirements
- Manufacturing Production Process Development—develop, implement, and improve the manufacturing process through early production and process changes; assess product and process design for manufacturability
- Quality Assurance—ensure the manufacturing system meets quality system requirements as defined by business and its customers
- Health, Safety, and Environmental Assurance—ensure that the manufacturing system meets health, safety, and environmental requirements
- Maintenance, Installation, and Repair—ensure that the maintenance of the manufacturing system fulfills customer and business requirements; install and repair equipment on the manufacturing floor
- Logistics and Inventory Control—plan and control the movement and storage of materials and products in the manufacturing system

Source: National Coalition for Advanced Manufacturing 2001.

Education and Training: 8 Preliminary Concentrations
- Workforce Trainer
- Paraprofessional/Paraeducator
- Childcare Concentration
- Standards Development
- Assessment Development
- Training Development
- Communications/Outreach/Marketing
- Financial Management

Source: *Get Involved!* 2000.

Retail Trade, Wholesale Trade, Real Estate & Personal Services: 2 Preliminary Concentrations
- Customer Service—learn about products or services, assess customer needs, educate customer, meet customer's needs and provide ongoing support
- Sale—prepare for selling, gain customer commitment and close sale, develops and implement a sales follow-up plan
- Inventory Management and Other Possible Concentrations—more data being collected

Source: *Customer Service and Sales Skill Standards. Preliminary Release—For Comments Only* 2001.

Arts, Audio-Video Technology, and Communication. A Career Cluster Framework identifies numerous occupations in the six pathways of the cluster at www.artavcomm.org/aavtc/clusterstandards.htm. Pathway Standards identify content and technical standards for each pathway at www.artavcomm.org/aavtc/clusterstandards.htm.

Health Science. The Health Science Cluster has adopted the National Health Care Skills Standards developed under earlier U.S. Department of Education and Department of Labor projects. The curriculum framework (www.wested.org/nhcssp/welcome.html) provides six sets of content standards intended as a template for users to apply or adapt to meet their specific needs. Content standards identify knowledge and skills needed for each of the four subclusters listed in Table 2, as well as two sets of core standards. Health Care Core Standards include knowledge and skills in academic foundation, communication, health care systems, employability, legal responsibilities, ethics, safety practices, and teamwork for all Health Sciences occupations. Therapeutic/Diagnostic Core Standards apply to the Therapeutic and Diagnostic clusters and cover health maintenance practices, client interaction, intrateam communication, monitoring client status, and client movement.

Information Technology Services. Baseline information about information technology (IT) careers and occupations is at www.edc.org/EWIT/bltext.htm. ***The IT Career Cluster Model*** sketches four concentrations/pathways; academic, employability, and technical foundations for the cluster; and a foundation of IT skills for work and learning. The ***IT Occupational Framework*** lists specialty areas and sample job titles for each concentration/pathway. Links to a variety of IT Skill Standards and State IT Curriculum Standards are at www.edc.org/EWIT/resource.htm.

Manufacturing. The ***Manufacturing Core Overview*** at www.mfglinks.org/Rpt34_co.htm identifies skill sets for the Manufacturing Core. Technical Skills include 10 Core Responsibilities under Product Realization and Production. Workplace Skills (i.e., employability skills) include National Coalition for Advanced Manufacturing (NACFAM) Skill Standards for Advanced High Performance Manufacturing and SCANS Skills. Academic Skills include contextualized content statements in Language Arts, Mathematics, and Science.

Transportation, Distribution, and Logistics. Figure 3 of the ***Career Pathway Framework, Version 3*** at education.dot.gov/translinkage/library.html lists a variety of occupational areas and occupations for the seven proposed career pathways in the cluster.

According to Kimberly Green (2001) executive director of the National Association of State Directors of Career Technical Education Consortium, work has begun to develop the 11 remaining USED/OVAE clusters (see Table 1). A curriculum framework, assessment system, and certification system will be developed for each cluster, all with uniform nomenclature and a similar look and feel. Pilot testing of all three components for each cluster will occur at 110 sites, 10 sites for each of the 11 clusters. In addition, a translation tool will be developed to allow local practitioners to crosswalk occupations between the USED/OVAE 16 career clusters and cluster frameworks using Standard Occupational Classification (SOC) and the Classification of Instructional Programs (CIP) codes; this will help states report student enrollment and progress using the 16 USED/OVAE clusters. The 2-year effort is scheduled to be completed in June 2003. Updates are available at www.careerclusters.org.

NSSB: Under Development

The NSSB Common Framework (NSSB 2000) calls for three types of knowledge, skill, and performance standards for each industry sector:

- ***Core*** standards are common to all frontline jobs in the industry sector and critical to those jobs; they provide a broad-based introduction to work in the entire sector.
- ***Concentration*** standards are needed for the concentration—a major area of frontline responsibility, usually families of related jobs and occupations.
- ***Specialty*** standards are unique to a specific job or occupation, a specific industry (rather than industry *sector*), or even a specific company.

Both core and concentration standards have two components: a *work*-oriented component describing what needs to be done on the job and how well and a *worker*-oriented component describing the knowledge and skills the worker needs in order to perform competently.

The ***work*-oriented component** has three elements: (1) **critical work functions** are the major work responsibilities covered by a concentration; (2) **key activities** are the major duties or tasks involved in carrying a critical work function; and (3) **performance indicators** describe competent, effective performance of key activities. The ***worker*-oriented component** covers three categories of knowledge and skills: (1) **academic**—apply *across* industry sectors; rated as high, moderate or low complexity; (2) **employability**—apply *across* industry sectors; rated as high, moderate, or low complexity; and (3) **occupational and technical**—apply to a single industry sector. Specialty skill standards include the knowledge and skills unique to a particular job, occupation, or company.

Skill standards are now available for two NSSB industry sectors:

- **Manufacturing, Installation, and Repair.** Core standards for the entire industry sector and the six concentration standards are at www.msscusa.org/.
- **Retail Trade, Wholesale Trade, Real Estate, and Personal Services.** Preliminary concentration standards (released for comment only) are available for two concentrations, Customer Service and Sales, at www.ssvolpart.org/ssvp.htm.

Can You Use Information from Other Cluster Frameworks?

If you work in a system with career clusters, no matter what specific role you play, some information will have to come from that system, in particular the specific details of the framework—nomenclature, complexity, organizing principle, and individual occupations grouped in clusters. You will also need to consult your own system on how career clusters might tie into related elements—state academic, proficiency, or graduation standards; program-specific occupational competency lists; or industry-endorsed national skill standards. Finally, only your own system can spell out the specific details of your role in designing or delivering integrated, contextualized academic and occupational instruction.

However, you might find information from other cluster frameworks very helpful in learning more about the workplace. If you are a CTE teacher or career counselor, you might use the information about occupations in another framework to expand your focus on the workplace, learn about a broader range of occupations across a whole cluster, and identify knowledge, skills, and abilities common to all occupations in a cluster. If you are an academic

teacher, you might be able to use that same information to learn more about how workers apply and use academic skills in a whole range of occupations. Both CTE and academic teachers might be able to use the instructional and curriculum resources in other frameworks as a model in developing a thematic curriculum that presents vital academic and employability knowledge and skills in concrete, relevant workplace applications. Administrators may be able to profit from the lessons others have learned and guidelines they offer for support and leadership.

An additional source of detailed information about occupations is O*NET, the Occupational Information Network, a database of worker attributes and job characteristics that replaces for the former ***Dictionary of Occupational Titles*** (DOT) (***What Is O*NET?*** 2001). Information about occupations includes the following (***The O*NET Content Model*** 2001):

- Worker requirements (basic skills, cross-functional skills, general knowledge, education)
- Worker characteristics (abilities, interests and work values, work styles)
- Occupation characteristics (labor market information, occupational outlook, wages)
- Occupation specific (occupational knowledges, occupational skills, tasks, machines, tools, and equipment)
- Occupational requirements (generalized work activities, work context, organizational context
- Experience requirements (training, experience, licensing)

And the Bottom Line?

The bottom line is that career clusters are a different way to organize information about occupations for CTE and academic programs and instruction. Career clusters don't replace viable occupationally specific CTE programs. Rather, they are a tool to broaden the scope of CTE beyond the traditional areas (Ag, Business, and Family and Consumer Science, for example) to provide students with a broader, more durable preparation for the world of work. Career clusters are one vehicle for contextualized instruction that integrates academic, employability, and occupational knowledge and skills in a concrete workplace context. Career clusters may require different approaches for CTE teachers, academic teachers, career counselors, and administrators—a broader workplace focus for some, a concrete workplace context for applied academics for others, a different approach to guiding students, a need for leadership and support. What will your role be?

References

Andrew, E. N. et al. ***Lessons Learned: Five Years in the Urban Schools Network.*** Berkeley: National Center for Research in Vocational Education, University of California, 1997. (ED 424 413) www.nccte.com/publications/ncrve/mds-11xx/mds-1110.html

Career Areas to Explore and Jobs in Them. Bloomington: Indiana Career and Postsecondary Advancement Center, 2001. icpac.indiana.edu/infoseries/is-65.html

Career Field Brochures. Salt Lake City: Utah State Office of Education, 2000. www.usoe.k12.ut.us/stc/resource/career%20field%20brochures.htm

Career Pathway Framework, Version 3. Washington, DC: Career Cluster Transportation, Distribution and Logistics Initiative, 2001. education.dot.gov/translinkage/library.html

Certificate of Advanced Mastery. Salem: Office of Professional Technical Education, Oregon Department of Education, 2001. www.ode.state.or.us/opte/Cam/index.htm

Core ITAC for Career-Focused Education. Integrated Technical and Academic Competencies. Columbus: Center on Education and Training for Employment, The Ohio State University, 1999. (ED 444 000) www.cete.org/products/main/pdfdocs/itac-core.html

Customer Service and Sales Skill Standards. Preliminary Release—For Comments Only. Washington, DC: Sales & Service Voluntary Partnership, 2001. www.ssvolpart.org/ssvp.htm

Dutton, M.; Buchta, L.; Leary, M.; and Edling, W. ***Education and Work: Education Reform Issues. The Rationale for an Integrated System for Workforce Education Curricula. 3d ed.*** Waco, TX: Center for Occupational Research and Development, 1997. www.cord.org/pdf/Education&WorkEducationReformIssues.pdf

Edling, W. H., and Loring, R. M. ***Education and Work: Designing Integrated Curricula. Strategies for Integrating Academic, Occupational, and Employability Standards.*** Waco, TX: Center for Occupational research and Development, 1996. www.cord.org/pdf/DesigningIntegratedCurricula.pdf

Get Involved! Washington, DC: Education and Training Voluntary Partnership, 2000. www.etvp.org/getinvolved.htm

Green, K. Personal communication, July 25, 2001.

Hoachlander, G. ***Toward a New Framework of Industry Programs for Vocational Education.*** Berkeley, CA: MPR Associates, 1998. (ED 443 969) www.ed.gov/pubs/FrameworkIndustry

Hudis, P. M. ***Building Linkages: Making Integrated Standards Work for Education and Industry.*** Washington, DC: Office of Vocational and Adult Education, U.S. Department of Education, 2000. (ED 443 006) www.ed.gov/offices/OVAE/bldlinks.pdf

National Coalition for Advanced Manufacturing. ***MSCC Skill Standards: A Blueprint for Workforce Excellence. A Quick Orientation.*** Washington, DC: Manufacturing Skill Standards Council, 2001. www.msccusa.org/

National Skill Standards Board. ***Built to Work: A Common Framework for Skill Standards.*** Washington, DC: NSSB, 2000. (ED 448 269) nssb.org/btw.pdf

Occupational Outlook Handbook. 2000-01 Ed. Washington, DC: Bureau of Labor Statistics, U.S. Department of Labor, 2001. www.bls.gov/ocohome.htm?H2

Ohio Career Resource. Columbus: Office of Career-Technical and Adult Education, Ohio Department of Education, 2001. www.ode.state.oh.us/ctae/careerresource

The O*NET Content Model. Washington, DC: U.S. Department of Labor, 2001. www.onetcenter.org/content.html

Sommers, D. A. Personal communication, November 2001.

U.S. DOE and OVAE 16 Career Clusters: Securing Futures. Stillwater: Division of Innovative Programming and Research, Oklahoma Department of Career and Technology Education, 2001. www.okcareertech.org/ipr/DOE_16cc.htm

What Is O*NET? Washington, DC: U.S. Department of Labor, 2001. www.onetcenter.org/overview.htm

The Highlight Zone: Research @ Work is designed to highlight research findings and provide a synthesis of other information sources. The intention is to help practitioners apply and adapt research results for local use.

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